Performance Assessment

of the

Midwest Research Institute

at the

National Renewable Energy Laboratory

for the

October 1, 2002, through March 31, 2003 Performance Period

Prepared

by the

Office of Energy Efficiency and Renewable Energy's

Performance Evaluation Board

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--EERE Performance Evaluation Board Report--

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1.0 Science and Technology - *MRI will deliver high quality scientific and technological outcomes that advance DOE priorities and Program objectives.*

MRI's expert management of science and technology at NREL continues to facilitate outstanding scientific accomplishment across the spectrum of research areas assigned to NREL by EERE. In the area of solar research, NREL continues to be a world class laboratory and world leader in photovoltaic materials and device research. The leadership of the United States in the solar field is directly attributable to the ongoing efforts at NREL. In the FreedomCAR/Vehicle Technology program NREL continues to do an outstanding job of developing energy savings technologies, field testing new concepts, analyzing component results and impacts on national energy fuel use, and assisting industry with evaluating and implementing technologies that reduce fuel use and tailpipe emissions for vehicle ancillary loads, such as climate control loads. In support of the Distributed Energy and Electrical Reliability program NREL published the draft Distribution and Interconnection R&D Strategic Roadmap document, conducted the DOE Distribution & Interconnection R&D Program Annual Review meeting, and facilitated the passage of the IEEE P1547 interconnection standard with 91 percent affirmative ballots. NREL has successfully achieved program expectations in the Industrial Program. NREL continues its long tradition of excellence in Wind research as well as Geothermal, Buildings, and the Federal Energy Management Program. NREL also works closely with the Office of Science (OS) to conduct research on the basic and fundamental science issues associated with photovoltaic effect in materials. Under the leadership of the MRI team, NREL's scientific support of EERE's programs has been superior.

NREL maintains strong in-house research teams in all program areas including, but not limited to, wind, biomass, and solar, who work diligently at advancing the science in their area of expertise. In many cases NREL employs world leaders in the field. NREL uses the in-house expertise to manage and help guide complementary research conducted at other national laboratories, universities, and industry consistent with its designation as a Federally Funded Research and Development Center (FFRDC).

EERE emphasizes the importance of timely contract closeouts to the success of all of EERE's programs. NREL and EERE management conducted a lessons learned evaluation of the Hybrid Electric Vehicle initiative and identified a number of steps that, if implemented, could reduce the time to contract closeout. These steps are applicable to all DOE efforts at NREL. Finally, EERE notes that NREL program managers must continue its efforts to develop and use of National Environmental Policy Act tools early in the planning process.

This Critical Outcome is rated "Outstanding".

1.1 Demonstrate the quality of scientific and technological outcomes.

Significant Achievements:

- NREL and a major private sector company were selected for joint research award for work improving the performance of photovoltaic multi-junction solar cells. This is the first time this award was made by Scientific American for exceptional contributions to science and technology.

- DOE's Office of Science/Basic Energy Sciences conducted a peer review of NREL's work in photochemistry and nano-science, much of which is related to photovoltaics. The peer review rated the research outstanding and stated overall this is an excellent program that provides basic science needed for the development of new photovoltaic technologies at NREL.

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- DOE has significant investment and expectations for the low-cost, polymer-based solar water heating project that NREL manages. In order to maximize DOE's investment, valuable and timely evaluation and guidance has been provided by NREL staffers to the industry teams working on this project. On a site visit trip to the two teams in January, for example, prototype solar water heaters were inspected and analyzed for remaining developmental obstacles and refinements needed to bring the systems to field-testing stage and later certification. NREL's input helped move along this project and ensure that successful solar water heaters would ultimately be developed.

- NREL staff scientists have overcome problems with instrumentation and data monitoring equipment in support of the Lamar tall tower (100 meter) measurement project. This enabled delivery of initial results of turbulence inflow to designers at GE Wind to establish that the environment was more severe than expected. Staff have been innovative in identifying and resolving interactions between the tower legs and the sonic anemometer, and problems in supplied electronics. This is a major contribution to Low Wind Speed Technology development, and has established a measurement baseline for a critical issue to the wind industry.

- NREL staff continues to mine the data from the NASA Ames wind tunnel test. Senior staff have planned and organized an IEA aerodynamics task designed to lead to improved aerodynamic models based on operative physics, rather than empirical observations. A prototype website has been built to determine the feasibility of archiving, processing, and distributing Unsteady Aerodynamics Experiment (UAE) wind tunnel data to IEA Annex XX participants via the internet.

- NREL completed a new option for Dynamically Comparing Simulations In ADVISOR. ADVISOR results can now be compared dynamically through an improved graphical user interface. Graphics created in Altia allow a user to see the status of two vehicles as the simulation steps through time. A few examples of the outputs include fuel converter efficiency, engine and motor shaft output power, and battery state of charge.

- NREL designed and developed in conjunction with Measurement Technologies Northwest a self-contained thermal manikin. All components have been fabricated including 126 individually computer controlled sweating and heating manikin segments, breathing apparatus, energy storage, water storage and distribution, and wireless communication. This manikin is the world's first fully-wetted porous metal skin manikin with fine resolution, no external power, water lines, or communication connections. This complex sensor will permit industry to rapidly and accurately access advanced climate control systems that could potentially reduce our imported oil by 7.5%.

- NREL worked with the University of California at Berkeley to complete measurements of local and global thermal sensitivity coefficients for the human body. Linear regression analysis has been completed to predict a typical occupant's response to a transient, thermally nonhomogeneous environment. Nonlinear regression analysis has been initiated. The results should lead to predicting the response of occupants to new and innovative automotive climate control systems.

- NREL worked with a major automobile company to compare outdoor test results with indoor climate control testing. A comparison of the results showed the impact of indoor testing to evaluate climate control systems. In particular, the test result showed the impact of the spectral effects of the lighting system, the geometry of the lighting system, the effective radiant temperature of the test cell, and the target size of the lights versus the sun.

The test results showed significantly higher roof temperatures, window temperatures, and instrument panel temperatures under the equivalent radiant load.

· NREL worked with a private battery company to determine the optimum thermal design for a Li-ion battery pack and determined which parameters where most sensitive to keeping the battery cooled. The result was an improved design which will improve battery life. NREL is also developing thermal test procedures for advanced batteries which will be used as a standard for the industry.

· An NREL scientist received an award of excellence from the American Society for Testing and Materials. The award was given for the scientist's service as chair of a committee on gasoline and oxygenated fuels and for work in developing the Reformulated Gasoline Research Report.

· The Society of Automotive Engineers (SAE) gave an SAE Recognition Award to an NREL scientist for distinguished service as Chair of the 2002 Power train and Fluid Systems Conference and Exhibition.

· An NREL researcher gave an invited presentation at the National Petrochemical and Refiners Association's Lubricants and Waxes Annual Meeting. The meeting brought together professionals in the refining and finished lubricants industry and provided an excellent opportunity to share projec*t* results with major stakeholders.

· NREL's hyrdogen research and development program continues to produce quality research that support EERE's hydrogen program goals.

Notable Achievements:

· NREL was awarded the National Energy Resources Organization Award for its triple-junction concentrator solar cell. This record-breaking 34% efficient PV cell has potential to make PV concentrators viable in a number of markets. When optimized for terrestrial concentration illumination, its efficiency will reach more than 35%. NREL researchers now have an intense research effort underway to embellish this cell structure with a fourth junction and achieve approximately 40% efficiency under concentrated sunlight.

· NREL senior staff provided significant technical support to the symposium, "Wind Turbine and Other Renewable Energy Systems," for the 4th ASME/JSME Fluids Conference. The ASME/JSME Fluids Conference, sponsored jointly by the American Society of Mechanical Engineers and the Japanese Society of Mechanical Engineers, attracts hundreds of scientists, engineers, and program managers working in various areas of fluid dynamics, including renewable energy systems. This symposium constitutes a major vehicle for subject-oriented professional peer review and technology transfer.

· NREL completed the unintentional islanding testing with an industry partner. This is the first detailed testing of anti-islanding procedures in P1547.1 with a synchronous generator (125 kW diesel generator). The ability to control unintentional islanding is cited as the #1 safety concern by utilities for accepting DER for interconnection with the grid.

· NREL continued to show excellent progress in materials research and coatings development to achieve higher current densities of new superconductors. These new materials, once successfully developed, will have a high impact on improving electricity reliability and electric infrastructure security.

- NREL conducted additional detailed analysis of electrochromic window coatings provided by industry partners in DOE's advanced window coating durability testing program. These research results are being used by industry to modify and improve coating performance.

- An NREL managed contractor released the final draft of the Zero Energy Homes Roadmap in January. This roadmap is based on four industry and stakeholder group meetings conducted over the past two years. In the next reporting period, the ZEB staff requests that the NREL staff to work more closely with the Building America program to integrate the activities of ZEB and BA to the fullest extent possible.

Significant Deficiencies: None.

Notable Deficiencies: None.

1.2 Demonstrate excellence in program planning and management.

Significant Achievements:

- NREL staff have continued their superior work and personal commitment to furthering the development of solar energy technologies. Highlights include:
  - Providing excellent support to DOE, the National Academy of Sciences, and others, in completing the Concentrating Solar Power (CSP) technology review
  - Providing vital assistance in preparation of multi-year and annual operating plans
  - Cooperating with DOE and Sandia in migrating the PV portion of the solar database from NREL to Sandia
  - Continuing to perform R&D functions in spite of a very challenging budget situation in CSP
  - NREL has done an excellent job ensuring that earmarked funds are managed to serve the national interest.

- The National Center for Photovoltaics (NCPV) Advisory Board reviewed the plans and budgets of the NCPV and offered its concerns and recommendations for increased emphasis on silicon and thin film R&D, systems and module reliability R&D, and facilitation of a new industry roadmap. The NCPV Board is made up of CEOs from the largest PV manufacturer as well as leading university researchers. The Board meets twice each year and provides valuable input to NREL's planning and management of ongoing research activities.

- NREL's program planning and management efforts continue to provide timely direction for the Solar Programs. NREL has provided consistent coordination and direction for the PV Subprogram through the National Center for Photovoltaics (NCPV) where senior managers in the PV Program meet regularly to discuss issues and plan activities. Current year activities are constantly assessed and results are factored into planning for future activities. The Annual Operating Plan (AOP) is a strong management tool for establishing key milestones, budget goals and other commitments that NREL uses with great success. All these planning activities are key to the solar program's success and consistent accomplishments.

- NREL led the NCPV and DOE Solar Program Review Meeting, which involved more than 300 DOE, NREL, university and industry partners. This review was the first time that all three subprograms (photovoltaics, concentrating solar power and solar hot water) were combined into a single review meeting. The meeting provided accomplishments within the research programs and served as a successful forum for advancing the mission of DOE and the Solar Program.

- NREL participated in the "System Driven Approach to Solar Workshop" and has key leadership roles in developing the Multi-Year Program Plan for the Solar Program. NREL is also applying its capabilities in analysis and modeling to lead development of the system driven approach for solar technologies. These activities are key to developing long-term R&D strategies.

- NREL NWTC management and staff supported the major transformation of the Wind Energy and Hydropower programs into one operating element with a single budget and annual operating plan. NREL supported development of a comprehensive new Multi-Year Technical Plan, central to the program's strategic streamlining and restructuring for enhanced performance based management, an integrated FY 2003 Program Execution Plan. Analytic activities have been initiated in conjunction with BPA, WAPA, TVA and other hydropower users to evaluate the potential benefits of combining the operation of wind and hydropower facilities to provide a stable supply of electricity to an interconnected grid.

- NREL management also initiated assessments of offshore wind energy that contributed to establishing new program analytic and outreach activities. With increasing interest in offshore wind projects planned on the East Coast, some U.S. stakeholders are looking to the Federal government for guidance and technical assistance. Similarly, US industry has shown increased interest in integrating wind power with other technologies as a way to reduce economic barriers, decrease costs, and expand deployment opportunities for wind. Integration opportunities include: wind-hydropower, renewable-hydrogen production, and coordinated operation of thermal and wind power plants. The Wind Program has begun technical assessments of offshore wind and wind integration opportunities to track domestic and international activities, better understand key issues, and determine the level of resources that should be committed on analysis, R&D, and outreach.

- Through the continued hard work of dedicated NREL program managers NREL has become the force in program planning and management. They have taken on a program request to open the National Bioenergy Center membership to other national laboratories who have significant capabilities that will help the biomass program become successful. Together we are developing one integrated multi-year technical plan that is resource loaded. This will ease the development of each year's AOP, provide performance milestones for all investments, and continue to provide focus to the programs investments. NREL is also the lead in pulling together information from all lab work and with the Golden Field Office (GO) providing one quarterly report that covers all OBP projects. NREL is to be commended for its willingness to be a driver for change and to help the program run the biomass program as a business.

- Completed evaluation of New York City Transit (NYCT) Orion VI Hybrid Electric Buses and established program to evaluate Orion VII Hybrid NYCT has on order.

- NREL played a significant role in helping to plan and generate a five year R&D plan for the FCVT office. As a result of the reorganization NREL has been working to integrate the heavy and light hybrid R&D and Fuels Technologies programs to take advantage of synergies between the two but similar technologies needed for advanced vehicles.

- NREL provided technical support for the development of the Distribution and Interconnection R&D Strategic Roadmap. This Roadmap was developed as an outcome of market requirements, technology research, stakeholder interviews, and a series of meetings and workshops conducted over the last two years. The draft Roadmap was summarily presented during the Annual Review meeting and feedback from meeting participants

was supportive and constructive. This Roadmap document will be used by the program to guide interconnection R&D efforts.

· NREL provided technical support for the DOE DEER Distribution and Interconnection R&D Annual Review meeting. The meeting was well planned, conducted, and attended (~200 attendees). FERC Chairman, utility decision-makers, technologists, regulatory stakeholders, and key DOE managers all participated. This meeting served well as both an information exchange forum on technical/business/regulatory matters and a programmatic review of the program's strategic directions.

· NREL's support and counsel for the vehicle and infrastructure demonstration solicitation has been invaluable to the program.

Notable Achievements:

· NREL organized and held a semiannual review of the entire Solar Program in March. All research activities at the laboratories, field offices, regional experiment stations and university centers of excellence reported on FY03 progress and accomplishments, and discussed with DOE headquarters plans for the remainder of the year and the first part of FY04. This two-day review of the Program provides direct and immediate feedback to management issues and funding priorities.

· NREL management and staff continue support of the Wind Powering America Program with technical analyses, outreach, travel and personal efforts well beyond the call of duty. NREL staff have been involved in a large number of state and regional meetings during the evaluation period. Parsons has been instrumental in participating on the National Wind Coordinating Committee executive committee and planning and participating on the NWCC's Transmission and Economic Development Subcommittees where the mission of the NWCC and WPA converge, as well as, related activities of the Utility Wind Interest Group.

· NREL managed the completion of the design phase, including environmental assessment, of a cost-shared geothermal district heating system in California. This allows construction to be completed in 2003. The district heating system will start operating during the 2003 winter heating season. This activity supports the geothermal goal of supplying the heat or power needs of seven million western homes by 2015.

· NREL completed monitoring of several high performance buildings. Final reports for all six projects are expected by the end of FY 2003.

· In a joint activity, NREL and the Residential Energy Services Network (RESNET) established a common methodology to benchmark homes for determining residential building energy use improvements on a national level. This is a critical step in quantifying the program benefits and progress toward meeting national energy goals.

· NREL's durability test standards for insulated glass units and electrochromic windows with activities with ASTM, NFRC, and IGMA are now being used as al draft standards (E 2XXX-02 and E 2YYY-02) by Task Group E06.22.07 of the ASTM, relating to testing of electrochromic smart windows.

· NREL and its Zero Energy Home (ZEH) contractor teams accomplished several key activities in conjunction with the National Association of Home Builders (NAHB) show in January. NREL exhibited DOE's "On the Path

to Zero Energy Homes." The NAHB Research Center convened focus groups of homebuilder sales and marketing professionals to determine the effectiveness and value of the "Zero Energy Home" terminology. An educational seminar on "Concepts in Practice: Building Net-Zero Energy Homes" was conducted.

· NREL worked with the Building America Program team to restructure the technical goals and implementation plans to focus on whole building integration R&D that can achieve 40%-70% energy savings in new residences. The NREL program managers provide good scientific support, improved their timely reports. They have developed methods to measure energy savings by Building America contractors and verify accuracy of actual energy savings along with a recording database.

Significant Deficiencies: None.

Notable Deficiencies: None.

1.3 Produce S&T accomplishments that advance DOE and program objectives.

Significant Achievements:

· NREL supports energy efficiency projects at Federal sites, providing technical assistance on available technologies and on alternative financing. NREL provides technical assistance for Federal renewable projects and renewable power procurement efforts. NREL provides technical information to Federal personnel through workshops, conferences, and meetings.

· NREL fabricated a ZnO/CdS/CIGS solar cell with a record conversion efficiency of 19.2%. This achievement set a new world record for polycrystalline thin film cells. NREL has been fabricating the highest efficiency CIGS solar cells since the mid-1990s.

· An NREL subcontractor achieved the highest ever one-sun efficiency in a triple-junction $GaInP_2$/GaAs/Ge structure. The 32% verified by NREL exceeds the previous record by nearly 2%. Initial concentrator measurements under 200X concentration also exceed the previous record - up from 34% to 35.2%.

· An NREL subcontractor achieved a new record for a large-area CIGS module fabricated on a single glass substrate. The 12.8% efficiency on a 4 ft2-area module exceeds the previous best of 12.1% achieved in 1999.

· NREL researchers met an important milestone by demonstrating a top cell of a tandem thin-film structure with an efficiency greater than 10%. NREL modeling showed that the range of optimum bandgaps for the top cell is from 1.45 eV to 1.8 eV, rather than 1.6 eV to 1.8 eV. A 10.9% $Cu(InGa)(SeS)_2$ alloy cell with a bandgap of 1.5 eV was made by IEC as verification. Additionally, NREL researchers modified CdS/CdTe devices and demonstrated 25% transparency and still had reasonable efficiency (9%). These results are relevant to the project's long term goal of achieving 25% efficient tandem polycrystalline thin film cells. (This is also a goal in Phase 1B "High Performance PV" solicitation.)

· An NREL subcontractor fabricated an all-sputtered ZnO/CdS/CdTe solar cell with 14% efficiency. The low-temperature deposition process allows for a greater range of materials to be considered for multi-junction polycrystalline thin films in the "High Performance PV" project.

- A major opportunity to advance Low Wind Speed Technology is integration of active and passive control systems to reduce loads. Accordingly, NWTC staff designed the Controls Advanced Wind Turbine (CART) as the operational test bed for experimental evaluation of various options. New, innovative wind turbine control strategies have been tested on the 600 kW CART at the NWTC to improve energy capture, reduce extreme and fatigue loads, and mitigate noise. The CART is specifically configured to accommodate a wide range of controls schemes, including a rotor that can be precisely controlled over a wide range of operating speeds and torques. A senior NWTC staff recently received a Ph.D. using the CART test as the basis for the doctoral dissertation. This test bed will be used by several LWST partners.

- NWTC staff organized and hosted a meeting between electric power planners and operators, and wind turbine manufacturers and developers, and electric power regulators, to address limitations in existing electromechanical models for analysis of wind turbines under static and dynamic disturbances. NREL staff presented results of the transmission situation in the Tehachapi Mountains where dynamic limits prevented full export of wind power until NREL and other analysts recommended addition of static capacitance. Gaps, roles and responsibilities were assigned and wind turbine models will be shortly available to be used to address problems in areas such as Texas where wind power has grown faster than the transmission system can accommodate.

- NREL technical contribution to the "The Symposium on Biotechnology for Fuels and Chemicals" every year is significant and valuable to the science discipline. With record attendance in its 25th year, this meeting serves as a magnet for communicating high quality research and a focal point for developing partnerships among industry, universities and National Laboratories. NREL researchers have developed a very positive working relationship and should both be commended for their work.

- An NREL researcher has been instrumental in providing technical assistance to Tribal leaders in promoting the use of renewable energy technologies.

- NREL continues to maintain an excellent relationship with many of the nation's leading industries, and these industries continue to show great interest in NREL's work. Two suppliers have requested to collaborate with NREL on climate control seats and photovoltaic sun roofs for parked ventilation systems.

- Upgrades to Technical Targets Tool completed. Since the team presented the Technical Targets Tool to the FreedomCAR Technical Team in January, two new Power train options have been added to the fuel cell Power train options originally in the tool – hybrid gasoline-electric and conventional gasoline Power train.

- NREL scientists provided an important analysis on Fisher-Tropsch Diesel fuels. The well-to-wheel analysis was presented at the October 2002 public rulemaking workshop and proved to be crucial to DOE's decision to postpone the rule.

- NREL managed the web-based tool FAST, which is used to evaluate Federal agency compliance with EPACT alternative fuel vehicle purchase requirements.

- Phase one test results from three engine emissions control test platforms was completed. The results provide the baseline data necessary for evaluating the long term effects of fuel sulfur levels on advanced NOx absorbers systems.

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- NREL launched a project to evaluate the use of a hydrogen/natural gas (HCNG) in a commercial transit bus application. The engine will utilize an advanced dual fuel injector previously developed under DOE sponsorship.

- NREL completed the "Advanced Utility Metering Guidebook" for Federal Agencies.

- NREL published the report "Renewables on Public Lands", an assessment of renewable energy opportunities on Bureau of Land Management lands.

- The *IEEE P1547 Draft Standard* was successfully affirmed in the voting by the 230 IEEE Standards Association P1547 ballot group members, with 91% affirmatives received. This Draft is now being prepared for the IEEE Standards Board June 2003 meeting for publication approval. Based on that schedule, the standard would be published this summer.

- NREL evaluated a new indirect evaporation cooler design with an industry partner. The staged design utilizes a unique manifold and flow arrangement to consistently cool supply air below the ambient wetbulb temperature without increasing its humidity. The device requires no refrigerant or moving parts other than fans and achieves an energy efficiency rating of over 12 at ambient humidity under 50%. The technology is a natural complement to desiccant dehumidification, as the performance characteristics of each extend the others.

Notable Achievements:

- NREL studied the growth of GaInAsN by two different techniques (MOCVD and MBE) to identify the role of defects. The study specifically looked at the effects of carbon and oxygen, and vacancies in films grown by the two techniques. Understanding defects in this material is key to achieving greater than 40% efficiencies.

- NREL and Resource Center staff validated a new wind map of New Mexico that identified considerably more wind potential than shown on earlier maps. A 200 MW project is now being planned for that region.

- NREL advanced innovative heat transfer concepts using both transpired fins and tabbed fins, as well as the fin-on-plate heat air-cooled condenser. NREL worked with Mammoth Pacific to assist in collection and analysis of data on evaporative cooling enhancement of air-cooled condensers for binary power plants during the hot summer months when plant output declines as the ability to reject heat declines. In addition, NREL expanded testing of PPS coatings to other sites and to more rigorous conditions.

- Completed Data Collection on Norcal Waste LNG Trucks. NREL completed a six-month data collection on 14 LNG class 8 trucks utilizing the latest version of the Cummins-Westport LNG High-Pressure Direct Injection (HPDI) technology.

- NREL led the effort to define SAVEnergy audit database requirements and to use the information to validate impact of SAVEnergy activities.

- Daily performance data for several of their DG systems are available for public access. This is the completion of a significant project milestone by RealEnergy. Additionally, the report on RealEnergy's Distributed Energy Information System was completed and will be made available on the DOE web site.

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Significant Deficiencies: None.

Notable Deficiencies: None.

1.4 Effectively communicate and transfer NREL-developed knowledge and technology.

Significant Achievements:

- An NREL researcher won a prestigious Federal Laboratory Consortium (FLC) awards for excellence in technology transfer. This award was for the transfer of the PVSCAN and PV reflectometer to GT Equipment Technologies, Inc. (GTi). With the transfer of these two related technologies to GTi, the international PV community has access to two essential pieces of analytical and monitoring equipment that helps manufacturers produce high yields of high-quality cells and modules.

- An NREL researcher won a prestigious Federal Laboratory Consortium (FLC) Award for Excellence in Technology Transfer. FLC is a nationwide network of more than 700 organizations that provides a forum to develop strategies and opportunities for linking laboratory technologies and expertise with the marketplace. This award (joint with Brookhaven National Laboratory) is for the development and transfer of a Smart, High-Performance Polyphenylenesulfide (PPS) Coating System. The PPS coating system represents a giant step forward in the technology of coating steel surfaces for use in hostile corrosive environments and can be used in a wide range of applications - from heat-exchanger tubes in geothermal power plants to chemical processing facilities, railroad tank cars and more. Their efforts resulted in commercial deployment of the technology by a private company, which has made the PPS coating system its primary product.

- In the Solar Program, NREL works hard to protect its intellectual property and enhance technology transfer. NREL's collaborations with industry and universities are very productive. In addition to the teamed research, where laboratory, university and industry researchers work collaboratively on common technical problems, NREL directs and manages several cost-shared industry/university partnerships to directly advance photovoltaic technology in specific areas. For example, the Thin Film Partnership Program is a three-year cost-shared program with industry and universities that is developing the next generation thin-film technologies. The Photovoltaic Manufacturing R&D project is another example where NREL is working with industry to improve the processing and fabrication of PV products in the manufacturing line. Industry continually has high praise for these government/laboratory/industry programs.

- The Wind Powering America efforts and the outreach of the National Wind Coordinating Committee have been major successes for the DOE. DOE's success is directly attributable to the dedicated efforts of an NREL researcher. This researcher was recognized for his contributions at the FY02 NREL Staff Awards Ceremony, a prestigious award that recognizes staff members for exceptional contributions to renewable energy science and technology, achievement of NREL's goals, advancement of their professions and service in the community and at NREL.

- NREL lead a team of international experts to evaluate the impact of vehicle air conditioners on fuel consumption and CO_2 emissions at the request of the European Union (EU) and the approval of DOE. NREL presented "Fuel Consumption and Associated CO_2 Emissions Due to Mobile Air Conditioning" to a working group of 140 invited experts at the EU. NREL's modeling expertise is international recognized leading to support and funding from the U.S. EPA in this area.

- NREL scientists organized and conducted an international fuels conference with the Clean Air for Europe Program and the Japan Clean Air Program. At this conference, program activities involving clean fuel technologies being conducted in the US, Europe and Japan were shared.

Notable Achievements:

- The NWTC and Renewable Resource Center staff have developed a novel technique for production of the popular state wind resource maps. Rather than compete with a private wind mapping firm, NREL staff assemble a team of in-house and consulting meteorologists to work with the contractor selected by the State partner to validate the maps. Thus, NREL has transferred its mapping technology to the private sector while assuring quality control. During the reporting period, five maps were produced.

- Presented results of the NREL-led evaluation of New York City Transit HEV Bus Evaluations at the Electric Vehicle Association of America's Electric Bus Workshop.

- Digital Functional Vehicle Paper Presented at Conference in San Diego. A DFV paper entitled "Robust Design of a Catalytic Converter with Material and Manufacturing Variations" was presented at 2002 SAE Power train and Fluid Systems Conference in San Diego, CA, October 22, 2002.

- NREL provided technical assistance to Ghana officials in their development of technology transfer plan for selected renewable technologies.

Significant Deficiencies: None.

Notable Deficiencies: None.

Issues and/or Expectations for the Current Performance Period

Solar Energy Technology Program - The following items are critical to the Solar Energy Technology Program for the current performance period:

- Develop initial PVAdvisor model in support of the Systems Driven Approach to Solar Energy Technology Program management.

- Populate the Solar Database (as modified) at SNL and continue the outstanding technical and management relationship with SNL.

- Continue the development of a technology-neutral perspective with respect to integration of the photovoltaics, concentrating solar power, and solar water heating subprograms at NREL and SNL. This perspective must be evident in all planning documents issued by NREL program managers.

- Continue to work with DOE program management staff to ensure that Solar Energy Technology Program earmarked funds are strongly linked to DOE technology programs, and demonstrate this linkage through increased development of University projects that correspond with the Solar Energy Technology Program. Timely and detailed communications with Solar Energy Technology Program personnel regarding these efforts is critical.

- Advance the PV Science Initiative by completing the awards for 3rd generation PV university research subcontracts.

- Provide technical support to the Solar Energy Technology Program for the 2005 Solar Decathlon.

- Assess thin-film system performance as the technology enters the market-place jointly with SNL.

- Assess progress of the Million Solar Roofs program effort to install residential and commercial systems in support of DOE's assessment of the overall program.

Hydrogen Program - The following items are critical to the Hydrogen Program for the current performance period:

- Complete the Hydrogen Technical Requirements effort that documents all Hydrogen Program technical requirements and the basis (i.e., system or market driven) for each requirement.

- Complete the Hydrogen Technical Systems Analysis effort that documents all analytical models used for hydrogen production, delivery, storage, conversion, applications, and safety, and the assumptions used to analyze energy, environmental, and economic impacts.

- Complete the baseline for the Program Schedule and Cost Plan showing all tasks and milestones across all DOE participants.
- Complete the Systems Integration Plan to include a Configuration Control and Records Management System.

Distributed Energy and Electric Reliability Program - The following items are critical to the Distributed Energy and Electric Reliability Program for the current performance period:

- Developing a strong and seamless relationship with EERE and the Office of Transmission and Distribution.

Buildings Program - The following items are critical to the Buildings Program for the current performance period:

- NREL must assume a more active role in tracking the research progress of the consortia in meeting the *required* 40-70% energy efficiency goals.

2.0 Leadership - *MRI will lead NREL as an FFRDC to create opportunities that significantly advance the EERE mission while enhancing NREL's role as a recognized national and international asset.*

Under MRI's leadership NREL has enhanced and expanded its role as a Federally Funded Research and Development Center (FFRDC) in support of the EERE's mission. During the period NREL provided critical advice to EERE contributing to the development of EERE's strategic plan, the technical direction and composition of EERE's programs, and EERE's business management systems. NREL's objective and unbiased assessment of EERE's needs and resulting counsel is evidence of MRI's recognition of NREL's FFRDC obligation and is the hallmark of a healthy FFRDC. During the period MRI assisted EERE in the development of its approach to the

hydrogen program, which was greatly expanded and accelerated in support of the President's commitment to the nation in his CY 2003 State of the Union Address. Similarly, NREL assisted the Bureau of Land Management (BLM) to characterize the potential for energy production on federal lands using renewable energy, another Presidential priority. NREL also expanded its relationships with a number of stakeholders and research participants to leverage EERE's investments at NREL, including the Department of Defense, the National Aeronautics and Space Administration, and the Department of Agriculture, as well a numerous private entities, to better serve EERE's mission goals. During the period MRI completed a number of critical leadership activities, including the hiring of a director for EERE's National Bioenergy Center and completion of succession planning for NREL. Finally, NREL demonstrated leadership by establishing strategic partnerships with the California Energy Commission on subcontracted research in distributed generation system integration and interconnection R&D, and with the Power Systems Engineering Research Center by joining in as a full member.

The first half of FY 2003 presented NREL significant challenges. Most notably, the delay in FY 2003 funding could have resulted in a severe impact to EERE's program execution at NREL. MRI, through the strength of its management team, is managing this challenge through superior planning resulting from NREL's Integrated Planning Process. MRI's planning preparation ensured that the bulk of execution material was prepared and coordinated such that when funding became available the program could be executed quickly. This approach, recognized by the National Academy of Public Administrators, minimizes the impact on EERE mission, and reduces uncosted balances to the lowest levels achievable without compromising research or support activities. Further, NREL's Integrated Planning process makes it possible to link strategic goals directly to individual employee performance, contributing to ownership of the mission by employees and allowing for the strategic reallocation of resources with changes in the mission. Finally, the MRI team took the initiative to reassess its teaming arrangement to better serve EERE's mission at NREL.

This Critical Outcome is rated as "Outstanding".

2.1 Provide technical leadership and input to the development of new opportunities.

Significant Achievements:

- MRI greatly expanded NREL's role as strategic advisor in fulfillment of its FFRDC role. This role, critical to EERE's mission success, is evidenced by NREL's contribution to EERE strategic planning effort, its substantially expanded role in the Hydrogen Program, and its support of the development of EERE's corporate business systems. The objective and unbiased advice, counsel, and assistance that NREL provided EERE was and will continue to be critical to EERE's future success.

- Through its national leadership across industries and interests, NREL represented and leveraged EERE's interests with numerous external stakeholders. NREL activities included studies to inform the nation on the economic potential of natural gas to meet the nation's future energy demands, studies to inform EERE on future program direction for technologies such as solar, wind, and hydrogen, as well as next generation technologies such as solid state lighting.

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· In support of the President's priorities, NREL partnered with the BLM to characterize and quantify the potential for energy production from renewable energy on federal lands. This study, entitled "Assessing the Potential for Renewable Energy on Public Lands", as well as NREL's work with other agencies such as the Department of Defense and the Department of Agriculture, represents a recognition of NREL's responsibility to showcase EERE technologies in a cost-effective and value-added manner.

· The American Association for the Advancement of Science held its annual conference in Denver bringing thousands of scientists to this premier meeting. NREL's presence was very prominent at the meeting, with NREL presenting information on nanoscale materials and super high-efficiency solar cells. NREL hosted tours of the laboratory for science writers and other attendees during the week-long conference. This involvement with the basic science community strengthens existing relationships and fosters new relationships for joint research that benefits NREL well into the future.

- NREL's National Wind Technology Center and its staff are seen as the premier wind energy research institution in the world. NREL has been successful in forging partnerships with many domestic and international entities. NREL staff participate in the International Energy Agency Wind R&D Annexes, chairing several tasks and host several meetings. In addition, NREL staff represent the interests of the United States wind industry in development of international standards in the International Electrochemical Society (TC88).

- Through their participation and leadership in GeoPowering the West, NREL staff also lead efforts during the performance period to publish and disseminate the report "Opportunities for Near-Term Geothermal Development in the Western United States". This effort entailed developing strong working relationships with national and state-level officials from the U.S. Departments of Interior and Agriculture to address the need for information on priorities for land-use planning to reduce impediments to access to federal lands for geothermal development.

- NREL leveraged EERE resources with USAID resources to develop a significantly improved renewable energy training program for developing countries and economies in transition.

- Identified the potential to evaluate medium duty Hybrid Electric Delivery Trucks being procured by FedEx. Worked with FedEx and its partners in the undertaking to bring the DOE Advanced Vehicle Testing Activities Team in as a project partner to conduct baseline performance, accelerated reliability, and fleet testing of the prototype hybrids being procured by FedEx.

- NREL collaborated with EERE and Argonne National Laboratory to publish the 2050 North American Transportation Study.

- NREL provided assistance in developing the EERE FY-04 Budget Roll-Out briefing material.

- NREL was invited to give the opening address for the automotive sessions at Glass Processing Days, a biennial international glass conference to be held in June 2003, on the benefits of solar-reflective glass.

- NREL has been invited to speak at the 5th International Manikin Meeting on NREL's thermal manikin and models in September in France.

- NREL will present two papers at the 6th Biennial Vehicle Thermal Systems Management Conference in the U.K in May: *"Multi-Variable Optimization of Electrically-Driven Vehicle Air Conditioning Systems Using Transient Performance Analysis"* and *"Application of an Integrated Modeling Process to Evaluate an Automotive Climate Control System"*. The papers presented numerical modeling techniques developed by NREL to predict the performance of advanced vehicle climate control systems.

- Technical leadership was evidenced in the area of thermal energy storage (TES), via an in-house task on building-integrated TES with emphasis on TES within wallboard as well as via subcontracted activities.

Notable Achievements:

· In consultation with the Hydrogen Program, NREL is developing a vertically integrated management model to assist the Program in meeting its mission goals. This model, which relies on the close coordination of Program decisionmakers and research providers, links systems analysis and integration capabilities in a real-time capacity to inform Program decisionmakers.

· PV and Solid-State Lighting cooperation initiated. NREL and the NCPV organized and held the Solar Program Review in March 2003. This conference brings together 300 of the Solar Program researchers to exchange information. NREL organized a special session to explore the synergies between PV and solid-state lighting technology. The session was well attended. NREL also participated with SNL, LBNL, PNNL and LANL to produce a white paper on Solid-State Lighting.

- No-exchange-of-funds data collection with wind project developers continues to show the strength of NREL's partnership activities and initiative. Not only is the pioneering data collection at Lake Benton II continuing for the third year, but simultaneous collection continued with Iowa projects, and efforts were expanded to include four Pacific Northwest projects, including the world's largest project. During the evaluation period, negotiations have been completed for monitoring four projects in Texas. Without NREL's effort, these data sets would not be available to the wind industry and State and Federal regulators, all of whom need to evaluate the impact of wind energy on electric power operations.

- NREL has taken the lead in working with the petroleum industry leaders to investigate the potential for platform work. Because of there contacts and continued good relationship with the industry and its technical leaders NREL is helping to leverage support so that the syngas platform may gain the same level of industry participation that the sugars platform has had over the years.

- An NREL researcher worked very hard to scope and design The Top Ten Bioproducts study. Gene knew how important it was to OBP to have both NREL and PNNL working together on this effort and it was his energy that brought the two labs together to support this analytical effort.

- NREL continues to be a significant contributor to the GeoPowering the West education and outreach project. In the performance period, NREL staff continued to lead efforts to form a state-level working group to address institutional and other non-technical barriers to development in the state of Alaska. NREL staff also continued to support current working groups in Nevada, New Mexico, Idaho, Oregon/Washington

- NREL led numerous communications and outreach efforts for the Geothermal Energy Program, including completing two issues of the DOE Insert to the GRC monthly bulletin, setting up and staffing the DOE booth at

the GRC 2002 annual meeting, and supporting new design activities for Geothermal Technologies Program website and associated sub-program sites.

- Opportunities for developing new partnerships with organizations such as the National Association of Regional Councils, have occurred due to NREL's leadership in the National Clean Cities Program. In a timely and efficient manner, NREL advises Clean Cities coordinators of funding opportunities and new tools and products and helps coordinators organize their "advancing the afv choice" events.

- Members of the Systems Analysis team met with Plug Power engineers and managers to present the results of several recent studies the Digital Functional Vehicle team has completed. The NREL presentation included results from topology optimization of stack end plates, finite element analysis of membrane pressure profiles, and thermal analysis of an auto-thermal reformer. The projects were real-world technical challenges defined by Plug Power and several design options presented by the NREL team are already being incorporated into new Plug Power designs. NREL and Plug Power are currently discussing with DOE how these efforts can be continued under the Office of Hydrogen, Fuel Cells, and Infrastructure

- Development of a basis for a DOE Thermal Energy Storage Program. NREL participated in relevant forums and workshops to describe technologies and to define needs and opportunities. NREL is forming strategic partnerships with companies within the thermal storage industry.

Significant Deficiencies: None.

Notable Deficiencies: None.

2.2 Demonstrate leadership in building strategic partnerships that leverage resources and advance DOE priorities.

Significant Achievements:

- Thin Film Reliability Team workshop held. NREL worked with the Florida Solar Energy Center in organizing a workshop with the PV industry on thin film module reliability. Improving the reliability of pre-commercial and commercial thin films is a high priority for the PV subprogram. NREL's foresight in recognizing the need for industry to work together to solve reliability problems is commendable.

- New partnerships were formed to develop advanced Low Wind Speed Technology (LWST) that will reduce the cost of electricity at low wind speed sites throughout the United States. For large wind systems, six industry projects are underway to develop LWST conceptual designs, components, and full-scale prototype systems, including a 5 MW design and a 2.5 MW design by industry partners. During this period NREL began preparation for a second LWST solicitation, including soliciting and responding to industry input from an earlier presolicitation notice in drafting the RFP. For distributed wind systems, NREL provided support to GO to release a competitive LWST solicitation in March 2003. Industry partners will be selected to develop small wind conceptual design studies, components, and prototype turbines. The large and distributed LWST efforts are targeted at technology viability goals defined by the program.

- The National Bioenergy Center, as it is now envisioned, will involve multiple laboratory capabilities all used by the program and industry to provide a significant leverage to advance the DOE program. This integrated resource will be sought after by industry as the one place that all the capabilities of the laboratories can be focused at the technology barriers for the biomass economy. NREL leadership and willingness not to control turf has made this capability possible.

- At the 2003 International SAE Congress in Detroit, Michigan on March 4, AVL Power train, Inc. announced that they were selected by NREL to license ADVISOR for commercialization. Under the agreement, AVL will develop and market ADVISOR 2003 and subsequent versions, and NREL will retain a free license to updated versions of ADVISOR and establish a cooperative research and development agreement (CRADA) between NREL and AVL to enable further collaboration and enhancement of integrated advanced vehicle simulation tools for DOE and the auto industry.

- As a result of DOE's Vehicle Ancillary Load Reduction Program at NREL, the EPA has requested a collaborative DOE/EPA effort to reduce the impact of vehicle air-conditioning loads on fuel economy and tailpipe emissions.

- The success of this project resulted in an invitation from the European Commission for NREL to present the impact of and opportunities to reduce fuel consumption and associated CO2 tailpipe emissions associated with vehicle air-conditioning systems.

- Collaborations were initiated with three industry partners involving the development of new renewable diesel blends, a biodiesel combustion study, and the supply both heavy duty and light duty camless engines for research on advanced fuels, including fuels for homogeneous charge compression ignition engines.

- WFO agreement with the California Energy Commission (CEC). NREL is negotiating this agreement to collaborate with CEC on subcontracted research in distributed generation system integration and interconnection R&D.

- NREL continued its work with EERE's Regional Offices to define how the national laboratories can best support EERE's deployment efforts as managed by the Regional Offices. During the period NREL and the Regional Offices explored a number of issues, including technology transfer and technology deployment, in an effort to best support EERE's deployment goals.

· NREL contributed to a number of high profile efforts to inform decisionmakers and other expert stakeholders on EERE technologies such as the National Academy of Science, the General Accounting Office, the Environmental Protection Agency, and the Bureau of Indian Affairs. The combined impact of these efforts contributes to the nation's knowledge of EERE technologies and how they can be applied.

· Building strategic partnerships is exemplified by establishing a WFO agreement with the California Energy Commission and joining the Power Systems Engineering Research Center as a full member.

Notable Achievements:

· NREL's efforts in Wind Powering America have built partnerships are several levels: between NREL (and DOE) and individual States, between NREL (and DOE) and two or more States, between NREL and the

National Conference of State Legislatures, between NREL and Native American Tribes, and between NREL and the Departments of Interior, Defense, Agriculture and Commerce, and between NREL and BPA and WAPA.

- Through the dedicated efforts of an NREL researcher, NREL has provided innovative pathways to involve Tribal leaders, Native American groups, and others interested entities in collaborating on the development and implementation of renewable energy projects on Tribal lands and at Tribal Colleges and Universities which have significantly accelerated the use of these technologies in Indian Country.

- NREL has provided new opportunities for the National Clean Cities Program with organizations such as U.S. EPA and its SmartWay Transport Program, Supplemental Environmental Projects. This renewed relationship has lead to possible funding partnerships for natural gas buses with its Green School Program.

- Established a partnership with the American Trucking Association to obtain survey data from heavy truck operators regarding idle reduction technologies. This data directly fed the development of a solicitation to establish heavy truck idle reduction technology demonstration and evaluation cooperative projects.

- NREL commenced Fuel Cell Hybrid Vehicle Modeling with a major automobile company to predict the fuel economy and operating characteristics of several proposed fuel cell hybrid vehicle configurations.

Significant Deficiencies: None.

Notable Deficiencies: None.

2.3 Develop NREL's leadership competency.

Significant Achievements:

- NREL acquired the services of a nationally-recognized individual to serve as the director for the National Bioenergy Center (NBC). With the acquisition of this individual the NBC is expected to become a critical provider to EERE's bioenergy program.

- During the performance period NREL staff successfully expanded their activities to include evaluations of heavy truck idle reduction technologies and medium duty Hybrid Electric Delivery Trucks.

- NREL scientists continued to play leadership roles in their support of the Advanced Petroleum Based Fuels Program. This leadership was demonstrated by performing as a co-chair of the steering committee and chairing various working groups.

Notable Achievements:

- MRI completed its succession planning for NREL. This effort provides MRI a strategic context against which future hiring can be conducted, and provides a career path for a number of individuals. This effort will be further refined by a chartered, cross-functional team to advance the succession planning effort to the next level.

- New 10kW PV array at DER Test facility (DERTF). Completed the installation of a 10kW PV array at DERTF. The installation of the 10kW PV array will allow for future testing of DC based devices like inverters, electrolyzers, and fuel cells at the test facility.

- Passage of the IEEE P1526 ballot. IEEE P1526 "Draft Recommended Practice for Testing Stand-Alone PV Systems" passed with 91% affirmatives. Over 40 IEEE SA members from industry, universities, and research laboratories signed up to ballot on the standard that gives procedures for testing stand-alone PV systems.

· NREL continued to strengthen its competence in the areas of electric transmission and distribution, beyond renewable energy sources.

This Critical Outcome is rated as "Outstanding".

3.0 Laboratory Viability - *MRI will ensure the long-term viability of the Laboratory by building and enhancing NREL's technical capabilities.*

MRI continues to build and enhance NREL's research, support, infrastructure, and management infrastructure in support of EERE's current and future mission needs in fulfillment of its Federally Funded Research and Development Center mandate. During the period NREL researchers and management made significant contributions to EERE's programs. Of particular note is NREL's timely and expert contribution to EERE's Hydrogen program on which the President's hydrogen initiative is dependent. A number of positions critical to EERE's success, including the director of the National Bioenergy Center and senior analysts supporting NREL's analytic capability, were filled during the period. It is anticipated that these positions will make significant contributions to EERE's mission in future performance periods. During the period preliminary design activities for the Science & Technology Facility (S&TF) were completed, and detailed design activities were initiated. The S&TF represents a break-through scientific capability that, if completed, will significantly lower the cost of producing thin-film photovoltaics by researching and eliminating technical barriers that are common to today's manufacturing processes. In addition to its scientific contribution, the S&TF is designed to achieve the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) "Silver" rating (baseline) with a goal of achieving a LEED "Gold" rating. The S&TF will be one of a few national benchmarks for advanced, integrated design and, as such, will contribute to the maturation of the nation's commercial facility design strategies. Finally, NREL has completed a number of site planning initiatives that provides EERE a roadmap for NREL's future development. Conducted with national, regional, and local experts, the General Development Plan provides a bounding case for NREL's development taking into consideration EERE's long-term needs, regional growth, and local needs. The effort also identified alternative methods to acquire the research and support infrastructure necessary to carry out EERE's mission.

This Critical Outcome is rated "Outstanding".

3.1 Build, enhance, and sustain NREL's scientific, engineering, and analytic capabilities.

Significant Achievements:

- NREL's Director's Discretionary Research and Development (DDRD) program continued to actively explore next generation technologies and transformational scientific issues. The FY 2003 DDRD program emphasizes the importance and promise of biomass and bioenergy technologies, as evidenced by NREL's substantial investment in these areas which account for approximately 50% of the total NREL DDRD investment.

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- NREL initiated a number of significant actions to enhance its leadership to EERE in the bioenergy field. During the period NREL hired a nationally recognized individual to lead EERE's National Bioenergy Center. Under its leadership as a Federally Funded Research and Development Center, NREL expanded its relationships with EERE's other program contributors including other national laboratories and private industry groups in an effort provide EERE objective and relevant program counsel. Finally, NREL made significant progress developing a state-of-the-art biorefinery, a critical step to the creation of the nation's commercial bioindustry.

- NREL provided extensive support to EERE's hydrogen program in support of the President's management initiative announced during the CY 2003 State of the Union address. In its role as FFRDC, NREL provided objective and unbiased advice to the program in the areas of program planning and technoeconomic analysis. These efforts contributed to EERE's ability to coordinate its hydrogen, fuel cells, and associated infrastructure research and development activities.

- NREL continued to expand the capabilities of the ReFUEL facility by upgrading and expanding the scientific equipment necessary to deliver critical program deliverables. These upgrades have been accomplished at a low dollar investment by taking advantage of unique opportunities to acquire capital infrastructure.

- NREL substantially strengthened its analytic capabilities through the acquisition of three energy analysts to complement EERE's analysis capability. These individuals are highly experienced in both technical and policy areas and will provide critical support to both executive and program management in the development and execution of NREL's strategic plans and subsequent investments.

Notable Achievements:

· NREL has maintained their high level of performance with respect to project design and construction, engineering support, and maintenance management. Projects are effectively managed to internal project management processes and procedures in accordance with DOE's Project Management Initiative to ensure project success within cost, scope, and schedule. Examples include the completion of the General Purpose Project (GPP) - Systems Interconnection Test Laboratory (SITL) final design and the Line Item Project - Science and Technology Facility (S&TF) completion of preliminary design and start of final design activities. Effective management of preventive, predictive, corrective, and deferred maintenance for facilities provides for a safe and reliable work environment for both office and laboratory workers.

- Utilizing its Strategic Plan, Sustainable Master Plan, and General Development Plan initiative, NREL continued to effectively manage its capital funding to maintain, enhance, and build EERE's scientific research and development capabilities in support of mission needs.

· NREL management established minimum U.S. Green Building Council - Leadership in Energy and Environmental Design (LEED) conditions for the Science and Technology Facility of a Silver ranking with a goal of obtaining a Gold ranking. This action is indicative of NREL's role as EERE's premier laboratory and a leader in sustainable design.

· Efforts on the completion of the General Development Plan initiative have been well received by NREL Senior Management, GO/EERE representatives, Design Advisory Board members, and Architectural/ Engineering subcontractors. Long term land usage incorporates a 25 year facility build-out to house all research activities

and on-site employees and included in-depth transportation and parking issues, pedestrian circulation, green space, and stormwater control measures, as-well-as potential offsite enterprise zones for future private industry. Funding options for facility construction were also analyzed to better understand the marketing strategies that will be required to implement the plan.

- NREL successfully completed all preliminary design activities for the Science and Technology Facility (S&TF) project, on time and within budget. Final design for the S&TF is underway and on schedule. Significant effort by the Integrated Project Team was required to provide value engineering on two occasions to successfully massage the facility design when ongoing estimate activities indicated an eventual construction cost overrun while maintaining project scope.

Significant Deficiencies: None.

Notable Deficiencies: None.

4.0 Mission - *MRI will manage and enhance NREL business and management systems, work processes, and capabilities to provide an effective and efficient work environment that enables the execution of NREL's mission.*

MRI's business management and business systems continue to provide responsive, flexible, and expert service to NREL management and research staff at a low cost. Despite the challenges presented by the significant delay in FY 2003 funding, EERE's programs at NREL continue to receive high quality and prompt service due, in part, to the robust nature of these systems. During the period a number of accomplishments were noted. NREL continues to attract and retain top-flight talent in a number of key areas including computational science, bioenergy, and analysis. Further, NREL continues to develop their internal staff through university and other training sources. NREL continues to make incremental investments in the foundational information systems technology to allow for better information collection, analysis, and dissemination. NREL legal services have invested significant resources in problem prevention over problem litigation, including timely training for managers and supervisors and counseling of NREL staff on a host of legal matters. NREL financial services continue to provide expert analysis across the range of NREL mission and support areas critical to management's ability to execute program especially during this challenging year. NREL contract services continues to quickly negotiate and place the instruments necessary to execute the program due to its streamlined systems. Combined with their well documented, simplified policies and procedures, as well as their internal investments in staff capability, financial and contract services continue to provide expert support to NREL and are expected to do so well into the future. NREL site operations continues to maintain EERE's capital infrastructure investment in good condition. NREL property management has maintained its loss level to well under 1%. During the period recognized a shortcoming in the close-out of foreign travel vouchers and took steps to address this issues. EERE anticipates NREL's performance in this area will improve over the next performance period.

This Critical Outcome is rated "Outstanding".

4.1 Deliver efficient, effective, and responsive business and operational support.

Significant Achievements:

- Significant improvements were made to NREL's Life Insurance and Long Term Disability programs. The changes resulted in better life insurance coverage at a lower cost and long term disability for all regular employees. These improvements contribute to NREL's ability to attract and retain staff at a lower overall cost.

- NREL continues to implement recommendations from the FY02 Make or Buy study of the Subcontract Audit and Cost/Price Analysis functions. During this period audit and cost/price analysis functions were outsourced and co-located with the subcontract administrators. Acquisition of this previously unavailable expertise and capacity has streamlined the close-out process yielding better rate determinations which, in turn, have improved NREL's negotiating positions for these instruments thereby minimizing the non-research component of each subcontract agreement.

- NREL Legal provided proactive advice and counsel and drafted documents related to the thoughtful management of a number of potentially difficult personnel actions. The proactive engagement and involvement of Human Resources and Legal to manage these actions has been significant in early resolution of potentially contentious matters, such that the laboratory has no litigation pending against it for the first time in at least ten years, and consequently, has contributed to cost containment efforts undertaken by the laboratory.

Notable Achievements:

- NREL Information Services successfully expanded their operational hours without increasing costs. NREL IS continues to be responsive to Counterintelligence and Cyber Security related requests. Responding to these special requests has a direct impact on the laboratory's ability to maintain a reliable infrastructure, as they are ad hoc in nature and require a quick response. NREL Information Services continues to maintain a sound cyber security posture by responding to security advisories.

- The Laboratory Finance Office continues to be proactive in establishing, achieving and reporting the performance metrics mutually agreed by the Lab and the Golden Field Office. Quarterly reports are submitted on each metric and reviewed by all parties. The Finance Office also presents the Performance Summary at an annual GO/NREL management meeting.

- After submitting the final version of the NREL FY 2003 Indirect Cost Proposal, the Laboratory was directed to revise the document to reflect the new EERE Eleven Program Structure. This realignment enables both EERE and NREL management to plan, monitor and report the program activities in a consistent manner. The Laboratory worked closely with Golden to revise the Cost Proposal and did so timely and accurately.

- Based upon processes developed and work accomplished in the previous period, NREL continues work on the Work for Others Reconciliation project. Failure to reconcile these past problems could result in costs being incurred without resources available, incomplete or inaccurate financial information for management decisions and poor program performance for external clients. This effort has also helped to streamline the NREL and DOE work for others closeout processes and has also reduced the financial uncertainties on DOE and NREL financial records. The original list of 231 projects to be closed has been reduced to 41.

- The NREL Finance Office provided timely and accurate analysis and forecasts to enable management to respond to several financial issues during the performance period including a significant increase in pension cost, the longer than expected delay in full program funding, and the two snow days. These analyses enabled NREL

management to make decisions which maintained operations, continued the program activities without interruption and controlled the impact of indirect costs on the program funding from EERE.

- NREL responded in a timely and productive manner to OMB directed changes which accelerate the schedule for monthly and yearly financial closings. This will help DOE show improved performance on the Financial Management portion of the President's Management Agenda. The NREL Finance Office worked collaboratively with Golden to identify opportunities to cut time from the existing processes, to streamline processes and to mutually agree on changes necessary to implement accelerated reporting.

- Early in the period, NREL took action to identify uncosted balances of FY 1998 Energy and Water Development Appropriation (Fund Type Y-8) monies, to cost and close-out all Y-8 funded agreements and to preclude the potential situation of uncompleted work which cannot be reimbursed. Failure to identify and address these funding issues would have resulted in planned program work being ceased at year end regardless contractual obligations.

- NREL successfully managed several challenges this period with regard to receipt of their budget. These challenges included initial uncertainty in the amount of funds to be received and very slow receipt of funds. Through aggressive planning and management NREL was able to minimize the program impacts of these issues. NREL is on-track to meet their Balanced Scorecard Goals in this area.

- The Contracts and Business Services Group successfully negotiated several difficult and high-profile agreements during this period. The negotiation on the new lease resulted in a $350,000 savings to NREL and the Government.

- NREL developed procedures for the quick transition between Security Conditions (SECON) Levels while minimizing operational impact and costs. Using a tiered approach, NREL can upgrade or downgrade the site's security posture depending upon the threat level established by the Secretary. NREL's procedures have been validated during the period when the Department's threat level was elevated from SECON 3 to SECON 2 (and back again). In all cases the transition occurred smoothly with minimal disruption to operations.

Significant Deficiencies: None.

Notable Deficiencies: None.

4.2 Build and enhance NREL's business and operational support capabilities.

Significant Achievements:

- NREL Legal provided critical training in a number of areas. These are: 1) the legal aspects of inventorship to the National Bioenergy Center; 2) the legal sufficiency of electronic laboratory notebooks for protecting laboratory intellectual property; and 3) methods of correcting staff behavior through corrective action plans. These training sessions are intended to be proactive in anticipating and avoiding claims and the attendant costs associated with them, and thereby complement the ongoing informal advice and counseling regarding best practices for managing procedural requirements associated with intellectual property and employee relations matters, respectively.

- NREL Established a working relationship with University of Colorado Human Subjects Committee to facilitate the necessary institutional assurance review for human subject related survey work proposed by an NREL researcher. Ongoing discussions with MRI in Kansas City to propose a standing mechanism by which human subjects reviews can be undertaken by the MRI human subjects committee as a corporate contribution.

- NREL successfully wrote and obtained DOE/GO concurrence on first-ever opportunity to execute a funds-in agreement to provide energy efficient assessment the Curacao (Netherlands Antilles) airport terminal design project. This ground-breaking effort directly supports NREL's performance objective 2.2 to demonstrate leadership in building strategic partnerships that leverage resources and advancement of DOE priorities by providing opportunity for Bechtel to avail itself of the FEMP-developed expertise in building efficiencies.

- Supported NREL Communications and Stakeholder Relations Office by drafting a unique legal agreement between NREL and the World Renewable Energy Network for a strategic partnership to organize, promote, and manage a major World Renewable Energy Congress to be held in Colorado in 2004. This effort demonstrated NREL's leadership in building strategic partnerships that leverage resources and advance DOE priorities because it provides a significant forum to present NREL's technical contribution to an international, world-wide audience.

Notable Achievements:

- NREL consistently strives to fully utilize women and minorities in all job groups. NREL's overall utilization of minorities and women exceeds the availability. Despite this exemplary effort NREL has undertaken an initiative to conduct a Diversity assessment by bench-marking with other Labs and best practices. Significant activities have occurred during the rating period to include attendance at various training opportunities, recognizing special emphasis programs, evaluating diversity advertising opportunities, and participating in various conferences. The networking and training will support NREL's goal of attracting and retaining a diverse workforce in order to meet NREL's vision and mission.

- NREL Contracts and Business Services Management continues to develop the professional capabilities and credentials of their personnel through formal education and other opportunities. During this period training requirements for subcontracting staff were developed based on organization and individual needs. Increased training of staff regarding indirect rates and other contract issues have been provided. In addition, the use of pre-planning meetings on solicitations, and pre-review boards on awards, where experienced Contract Administrators provide advice, have contributed significantly to the Lab's ability to make awards as efficiently and effectively as possible given the delays in funding.

- By partnering with GO, NREL has established a process that significantly reduces the cycle time required to process a modification to the Prime Contract. The new system includes the preparation of modifications in both hard copy and electronic copy and utilizes electronic processing to shorten NREL review time. This process has reduced the time required to process a modification from roughly 30 days to an average of 16 days for the latest four modifications.

- NREL continues to demonstrate keen attention to the various Human Capital Management business and management systems, work processes, and capabilities. Activities have been undertaken to conduct a Benefits Value Study which will contribute to enhanced employee benefits programs, conduct a Diversity Assessment to benchmark diversity program activities, further refine the performance appraisal process, enhance their learning

management system, and review and implement a Paid Time Off proposal. All of these initiatives contribute to attract and retain employees in support of NREL's mission in a cost effective manner.

Significant Deficiencies: None.

Notable Deficiencies: None.

5.0 Environment, Safety, and Health - *MRI will protect the safety and health of the NREL workforce, the community, and the environment.*

NREL continued to provide expert support in the environmental and safety fields that yielded benchmark results. NREL's performance measures continue to exceed both DOE and industry standards, and NREL's workers compensation costs are well below industry standards allowing more of each dollar to be invested in research over support functions. During the period NREL made significant progress on the draft South Table Mountain Environmental Assessment (EA). Completion of this document will provide EERE and NREL management with a substantial tool to judge the impact of a particular decision on the site and surrounding geographical areas such that management can make the best decision for NREL and its neighbors. During the period a fire occurred in a fume hood in the Solar Energy Research Facility. NREL's response to and the investigation of the fume hood fire that occurred was an excellent demonstration of professional capabilities and teamwork, which resulted in a thorough and objective assessment of the root causes and the development of lessons-learned and corrective actions that will enhance laboratory safety at NREL and, through a review by the Department's Office of Environment, Safety, and Health, will provide a valuable lessons-learned for the DOE Complex. NREL participated in the Under Secretary's DOE-wide safety conference in December, 2002, presenting its approach to management of injury severity through case management as a "best practice" to reduce both severity of injuries and the cost of those injuries. During the second half of FY03, GO expects NREL to demonstrate progress on the third-party EMS assessment and the evaluation of third-party EMS certification opportunities that were initiated in FY02. These efforts should lead to an overarching management system approach to ISM, EMS, and sustainable NREL.

This Critical Outcome is rated as "Low Outstanding".

5.1 Sustain excellence in safety, health, and environmental protection.

S*ignificant Achievements:*

- The Injury/Illness rates for the first two quarters of FY03 are 1.46 and 1.27 for an average of 1.37, which is well the DOE rate of 2.6 and the private industry rate of 2.0. 100% of all cumulative trauma disorder cases for the second quarter of the reporting period were successfully resolved without lost work days or referrals for additional medication attention, which exceeded the target of 90%; and, NREL's Worker Compensation costs continue to demonstrate a low injury severity rate and quality case management. The Performance Index, based on a DOE formula that provides injury costs expressed as "cents per hours worked, shows NREL's 5.4 cents per hour worked is well below the DOE average of 10.44 cents per hour.

Notable Achievements:

- In conjunction with NREL's voluntary participation in an external audit conducted by the State of Colorado Department of Public Health and Environment (CDPHE), NREL and GO jointly conducted a self-assessment and an operational surveillance of NREL's Waste Management and Minimization Program. This effort

incorporated a no-cost, third-party evaluation and advanced the best management practice of combining direct observations of ongoing work activities with traditional interview practices based on formal lines of inquiry. As a result of CDPHE's no-risk audit, NREL identified some opportunities for improving waste management practices.

· The draft South Table Mountain Environmental Assessment was completed and distributed for public and agency review during the reporting period. This draft EA was distributed primarily in electronic format (CDs and Web links), representing cost and efficiency process improvements. The diligence and attention to detail demonstrated by the NREL EA Project manager contributed to a quality document. Continued improvements in the coordination of environmental considerations in NREL planning efforts were evident throughout the EA process. For example, based on comments provided by other agencies, NREL conducted an additional investigation of expected traffic loads to facilitate future site development planning.

Significant Deficiencies: None

Notable Deficiencies: None

5.2 Identify and implement enhanced ES&H processes, practices, systems, and tools that enable the Laboratory to better meet its ES&H goals.

Significant Achievements: None

Notable Achievements:

- NREL expanded the scope and capabilities of its Emergency Response Team (ERT). Following an independent review of the ERT activities, additional training at the technician level was recommended for ERT members in recognition of their expanded role.

- NREL increased its environmental support capabilities during the period with the addition of an environmental engineer. This additional capability will increase NREL's capabilities and capacity to complete NEPA and other environmentally challenging activities in support of the EERE program.

- NREL presented its Sustainability Program at the DOE Environmental Management System workshop during the period. In an effort to better plan and execute its programs in an environmentally sound manner, DOE has been working to integrate sustainability and similar concepts in its EMS strategy. NREL's presentation was well received and served as a benchmark for NREL's internal EMS activities.

Significant Deficiencies: None

Notable Deficiencies: None

6.0 Outreach and Stakeholder Relations - *MRI will build strong and productive relationships and alliances with stakeholders, advance awareness and support of the DOE renewable energy and energy efficiency mission, and advance math, science and technology education.*

Operating according to a long-term outreach strategy, well-grounded in research, the Laboratory continues to demonstrate success in building on its national and local reputation, aligned with EERE's communication and outreach efforts, and enhancing science and math education. The four major elements of that strategy are: (1) an aggressive media relations program focused on making NREL a widely known and reliable resource for journalists from major news media; (2) a community relations program targeted at specific local stakeholders important to the Laboratory; (3) the production of effective and innovative information products for EERE; and (4) implementing quality education programs that inspire interest in science and math education to fill a critical need for bright young people to pursue careers in renewable energy research and development. Continual evaluation of results versus expectations results in modifications to programs and cancellation of those that do not bring sufficient results to justify the cost. This approach has led to an Outreach and Stakeholders Relations effort that remains dynamic, continuously improving, and in tune with the changing local and national climate. However, although the Laboratory's management and conduct of its outreach efforts is clearly exceptional, one area of concern is the extent to which NREL management and other elements of the Laboratory benefit from public affairs advice and counsel and how closely tied the key advisors in Laboratory's Office of Outreach and Stakeholder Relations are to what is happening in other areas of the Laboratory. This potential disconnect surfaced during this evaluation period when a meeting was planned with local economic development officials, and information about NREL's long-range planning efforts was discussed which DOE considered sensitive and potentially controversial. The Laboratory should evaluate the effectiveness of the critical advice and counsel role of its outreach staff.

6.1 Promote awareness of DOE/EERE and NREL missions and technologies, and build relationships that support the strategic directions of the Lab.

Significant Achievements:

- The Laboratory's national news media strategy of making NREL known as a dependable source for information on energy efficiency and renewable energy and publicizing the availability of a range of experts continues to pay off. Media coverage continued at a very high level, including 584 news stories with NREL mentions appearing during this evaluation period. The number is particularly noteworthy considering the Laboratory achieved it during a period when news organizations were largely preoccupied with the war in Iraq. Major coverage included The New York Times, Business Week, U.S. News & World Report, Atlantic Monthly, Rolling Stone Magazine, Scientific American, Christian Science Monitor and National Public Radio. Total estimated audience reach for the news coverage during this period is roughly 50 million. Another aspect of the news media strategy involves taking the fullest possible advantage of opportunities as they arise. Under this "heads up" strategy, the announcement of the President's hydrogen initiative offered the Laboratory considerable opportunity to get out in front of the news media, and to develop contacts for future stories, by making its hydrogen experts available to provide technical background information. Following this strategy, the Laboratory also took advantage of several opportunities with the many journalists attending the American Association for the Advancement of Science conference in Denver, including leading a roundtable discussion on hydrogen and hosting a tour of the laboratory.

- The Laboratory led the effort to organize the first-ever Solar Decathlon, including the Web site development and upkeep. The results were phenomenal on both counts, leading Secretary Abraham to say during a visit to the

Solar Village that it was the best DOE event he had ever attended. NREL's support to the Solar Decathlon public outreach program, led by the Golden Field Office, was critical to its success. Visitors to the village were estimated at around 100,000, and news coverage was extensive.

- NREL's technical support to EERE's communication effort continues to be innovative and state of the art. In partnership with the EERE Office of Communications and Outreach, NREL specialists developed numerous plans and products in support the programs' missions during this evaluation period.

Notable Achievements:

- Although much of the work of the Laboratory's Office of Communications and Stakeholder Relations provides indirect support to NREL's mission, the office has aligned many of their activities with those of various NREL program offices to help them meet their outreach needs and provide a "one stop" contact for stakeholders. Support to the NREL Technology Transfer Office included helping them develop their outreach plans, support for an Industry Growth Forum to pair investors with entrepreneurs, and arranging CEO (Colorado Executive Outreach) Forums and Stakeholder Technology Forums with stakeholders important to the technology transfer mission. Under the CEO Program, during this evaluation period, the Laboratory had formal meetings with the Colorado Nanotechnology Council, the Colorado Business Energy Partnership, Xcel Energy and the Colorado Governor's Office. In this first half of the fiscal year, the Laboratory has achieved less than half its annual target of six new contacts, so the effort will need to be accelerated in the second half.

- A new, but related, effort directed toward stakeholder partnerships is the Renewable Energy and Energy Efficiency Business Outreach Program, under which businesses in the region which might not consider reducing energy use or using renewable energy are invited to the Laboratory and educated on the potential benefits to their companies. This initiative is another example of the Laboratory's continual efforts to stretch beyond the standard outreach efforts employed by most laboratories.

- The Laboratory made a significant number of public appearances at national and local forums as part of its effort to build its national reputation. A solid national reputation benefits EERE by adding credibility to the technologies being developed, by helping attract top researchers, and by making the Laboratory more credible as a partner for top companies and universities. Among the speaking venues were the National League of Cities, U.S. Conference of Mayors, National Association of Investment Analysts, American Association for the Advancement of Science, Fulbright Scholars, and the National Academy of Engineering. A key element of the Laboratory's revamped local outreach strategy, based on data from a survey of local stakeholders, involves putting senior people in front of influential groups in the state. Laboratory staff spoke to 12 groups during this evaluation period: Lakewood Rotary, Loveland Rotary, Longmont Kiwanis, Denver UNESCO Chapter, Conifer Rotary, Aurora Federal Employees, Red Rocks Community College, Colorado Chapters of the Health Physics/Nuclear Physics Societies, Sierra Club Energy Campaign, American Institute of Architects Committee on the Environment, and ISA Denver Chapter.

- The Laboratory's consistent support to local economic development and its encouragement of spinoff companies earned it the "Genesis Award" from the Jefferson Economic Council. The award is presented annually to the organization which has a sustained impact on local economic vitality.

- NREL did a first-rate job in hosting several high-level visitors during this evaluation period, including Secretary Abraham, Assistant Secretary Garman and Senator Wayne Allard. Feedback from the Secretary's staff indicated he was highly impressed with the Laboratory, and he extended his visit by almost half an hour.

- A noteworthy effort the Laboratory has undertaken is a comprehensive evaluation of its outreach products and distribution systems to determine where there may be problems, where products may be out of date, and to ensure consistency with EERE's new information product guidelines.

- NREL responded quickly to a short-fuse requirement from EERE leadership for a redesigned Web site for the Hydrogen, Fuel Cells & Infrastructure Program. The site went live in time for the President's State of the Union address. It received 1,000 visitors during the address and 8,700 the next day. The number of visitors has remained relatively constant since then.

- The Laboratory held its most highly successful series of renewable energy workshops yet at Denver's National Western Stock Show. More than 365 farmers, ranchers and homeowners attended the three workshops on how renewable energy technologies can be used to help feed cattle, grow crops and power buildings on farms and ranches. Feedback from participants and Stock Show organizers continue to show the workshops are very popular.

Significant Deficiencies: None
Notable Deficiencies: None

6.2 Demonstrate value as a corporate citizen within the local community.

Significant Achievements:
- The Laboratory's visitor/tour program continues to break attendance records. At the mid-year point, even with restrictions on visitors due to a heightened security posture, 6,863 people visited the laboratory. If the number of visitors in the second half of the year equals that, the Laboratory will easily break the previous record of 12,250 for FY02. Much of the reason for the program's success can be attributed to a continuing program using research to determine visitor desires, finding activities appropriate to the Laboratory's outreach mission, developing a visitor outreach plan that precisely aligns messages and audiences, using creativity and innovation in developing programs, aggressively marketing activities, continuously evaluating programs, and feeding the results back into planning. One of the more innovative examples recently initiated is the Renewable Rangers Program for young students, under which young students can become Renewable Rangers by completing an NREL-developed renewable energy educational program. Such efforts help make NREL a more widely known and valued member of the local area, and enhance its ability to carry out the EERE mission. This research, planning, action and evaluation process, along with the Visitors Center long-term vision process described below, demonstrates a high degree of professionalism in the management of the Lab's visitors program.

Notable Achievements:
- One notable effort the Laboratory has begun is the development of a vision document for the Visitors Center. Early work involves research into programs and facilities of highly successful visitors centers. Based on the findings, a vision document will be developed to guide long-term planning for exhibits, staffing and programs.

· A Community Leaders Breakfast for newly inaugurated Rep. Bob Beauprez (R-CO) was one of the most successful community events the Laboratory has conducted. More than 40 community leaders from business, local governments and academia attended. The vast majority of those attending were high value in terms of their positions or influence, and many had never visited the Laboratory before.

Significant Deficiencies: None

Notable Deficiencies: None

6.3 Implement programs that advance high quality science, mathematics, and technology education.

Significant Achievements:

- The new direction set by the Laboratory's Education Office more than a year ago is showing results. The strategy, which involves high-level visibility in DOE and the national and local education communities, developing strategic partnerships to stretch the Laboratory's limited education resources, and implementing top-notch programs for DOE sponsors, appears to be producing beneficial results. Funding has increased from the Office of Science and from EERE, and partnerships with Denver Public Schools (DPS) and the Colorado School of Mines (CSM) are enabling the Laboratory to expand its reach and accomplish far more than it has in the past. The partnership with DPS has resulted in a 25% increase in minority participation in the Expanding Your Horizons, a 50% increase in DPS teacher interest in the Junior Solar Sprint, a realignment of the middle school science curriculum to include renewable energy, and 200% increase in participation the CLOUT tutoring program. The CSM partnership has resulted in a significant expansion of resources, including people and space to support NREL's expanding programs. Other partnerships in the development stages are expected to further expand the Laboratory's capabilities.

Notable Achievements:

- Indicators of the quality of NREL's education programs, in addition to the increases in funding from Science and EERE, came in several forms during this evaluation period. Requests listing NREL as the first choice under the Science Undergraduate Laboratory Internships Program totaled 223, more than any other DOE laboratory. In addition, two Laboratory researchers received DOE Office of Science Outstanding Mentor Awards, bringing NREL's total winners of this award to four. Also, some 95% of participants in the Colorado Science Bowl rated the competition highly in terms of fairness and organization.

- The Laboratory has been appointed to the Triangle Coalition for Science, Mathematics and Technology Education, a prestigious national organization. The appointment is the result of the Laboratory's efforts to move its education program focus to a higher level, beyond simply implementing educational programs and conducting events, and will open new doors for partnership opportunities and additional national recognition. The appointment follows the Laboratory's successful effort to strengthen its relationship with the National Science Teachers Association.

- The Laboratory's aggressive approach to recruitment of quality teachers for the Laboratory Science Teacher Professional Development Program (LSTPD) and Pre-Service Teacher (PST) Program, as well as its reputation for conducting a high-value program, has resulted in a 270% increase in the number of LSTPD applicants and a 700% increase in the number of PST applicants. A new recruitment approach of visiting school districts and speaking before teacher forums serves the dual purpose of spreading NREL's reputation across the state.

- NREL has supported DOE/GO's Equipment Gift Program in the past years wherein a large quantity of otherwise unusable computer equipment has been "Gifted" to various schools in support of the President's Executive Order 12821 and 12999. NREL has consistently provided excellent support in providing equipment and manpower to inventory, clean, administer and provide the appropriate title document for the final gifting to schools during this rating period. NREL's can do and customer service orientation have facilitated the process and made the programs execution a success.

Significant Deficiencies: None

Notable Deficiencies: None

This Critical Outcome is rated "Outstanding".

MRI's composite performance across all Critical Outcomes is rated as "Outstanding".